

Serial No. 09/938,453

Claims 13, 14, 20, and 21 are rejected as being unpatentable under 35 U.S.C. 103(a).

**Rejection Under 35 U.S.C. 112, Second Paragraph**

Claims 25-28 are rejected under 35 U.S.C. 112, second paragraph as being incomplete for omitting essential structural cooperative relations of the elements, such omission amounting to a gap between the necessary structural connections. The Office Action appears to believe that it is necessary for applicants to state the particular nature of the connection between the space-time regenerator and the joint equalizer, rather than stating "a space time regenerator coupled to said joint equalizer" and "a buffer-subtractor coupled between said signal detectors and said joint equalizer and between said space time regenerator and said joint equalizer" as claim 25 now recites. Similar objections are raised in regard to elements of claims 26-28

Applicants respectfully traverse this ground of rejection for the following reasons.

MPEP 2172.01 states "a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under 35 U.S.C. 112, second paragraph". Thus, it seems that the key requirement for such a rejection is that the elements that are not properly interrelated are essential elements defined by applicant(s) in the specification. In the instant application, applicants have not defined the elements in claims 25-28 as being essential.

Firstly, in this regard it is noted that applicants state the principles of the invention in the specification, i.e., the essential requirements thereof, saying at page 1, lines 26-29 "We have recognized, in accordance with the principles of the invention, that in a MIMO system the bit error rate floor caused by time dispersion can be reduced by employing a joint equalizer for all of the respective transmit antenna – receive antenna pairings that are possible in the MIMO system". Thus, everything else in the specification beyond this concept relates to specific embodiments of the invention and are not essential.

Second, by definition, dependent claims cannot recite essential elements of the invention. Rather, such essential elements can appear only in the independent claim upon which a dependent claim is based. If a dependent claim recited essential elements of an invention, then the independent claim from which it depended would not be a complete

Serial No. 09/938,453

invention. While it is true that an independent claim may include elements that are not essential to the broadest concept of the invention, a dependent claim never can when depending from a proper independent claim.

Additionally, applicants have the right to define their invention as they see fit. In this regard, applicants direct attention to FIG. 5 and its supporting sections in the specification. Because of the loop-type nature of the arrangement, applicants believe that adding further details to the claims at issue will actually make these claims less clear rather than clearer. Furthermore, the language of the claims at issue properly covers the system set forth in FIG. 5. Also, one of ordinary skill in the art would be aware of what types of inputs and outputs were employed for each recited element, as well as how to order them, and thus would readily understand the meaning of the claims.

Thus, claims 25-28 meet the requirements of 35 U.S.C. 112 and are allowable.

#### Art-Based Rejections

##### Rejection Under 35 U.S.C. 102(e)

Claims 1-3, 8-12, 15, 17-19, 23, 24, 29, 35, 36, 37, 41 and 42 are rejected under 35 U.S.C. 102(e) as being unpatentable over United States Patent No. 7,027,523 issued to Jalali et al. on April 11, 2006.

This ground of rejection is respectfully traversed for the following reasons.

The Office Action relies on FIG. 4 of Jalali et al. and its associated description as showing a joint equalizer as required by each of applicants' independent claims. However, FIG. 4 of Jalali et al. does not show an equalizer, let alone a joint equalizer.

The primary reason for this is that Jalali et al. is directed to a time division duplexed (TDD) system, which is a system that transmits data on the forward and reverse links via the same frequency band. (See Jalali, column 1, lines 9-12, 44-46, column 1, line 65 – column 2, line 1, column 2, lines 60-63.) It is well known that in a TDD system the characteristics of the forward link may be generally estimated by measuring the characteristics of the reverse link, and vice versa. (See Jalali et al., column 1, lines 46-62.) However, due to various factors, the forward and reverse links may not be exactly the same. Therefore, the Jalali et al. disclosure teaches methods for characterizing and

Serial No. 09/938,453

taking into account the small difference that may exist between the forward and reverse channels. (See Jalali et al., column 1, line 64 – column 2, line 17 and column 6, line 56 – column 8, line 15.) The overall corrected forward channel may then be used to determine preconditioning for the transmitted signal. (See Jalali et al., column 1, line 64 – column 2, line 17 and column 8, line 15 – column 9, line 4.)

The elements of FIG. 4 cited by the Office Action are directed to computing the foregoing, and not to performing equalization, let alone joint equalization. (See Jalali et al., column 17, lines 21-59.) Moreover, as should be readily understood, the components of FIG. 4 of Jalali et al. are not an equalizer because they include a matched filter stage and are computing the values for equation 4 of Jalali et al., i.e., the difference between the forward and reverse channels. Neither of these relate to computing equalization or MMSE.

There are references in Jalali et al. to MMSE. However, these references are to conventional, i.e., not joint, MMSE equalizers. Furthermore, these references are directed to situations where the channel matrix  $H_f$  for the forward link is not available. (See Jalali et al., column 19, lines 1-27.) In such cases, preconditioning of the transmissions is not possible and the teaching thus would seem to be to not use those elements of FIG. 4 of Jalali et al. that are directed to aiding in such preconditioning, since it cannot be achieved.

Thus, Jalali et al. does not teach or suggest any of applicants' independent claims. Therefore, each of applicants' dependent claims, each of which depend from a respective allowable independent claim, is likewise allowable over Jalali et al.

#### **Rejection Under 35 U.S.C. 103(a)**

Claims 13, 14, 20, and 21 are rejected as being unpatentable under 35 U.S.C. 103(a) over Jalali et al. in combination with various other references. This ground of rejection is respectfully traversed for the following reasons. Each of the rejected claims are dependent claims, and each of the grounds of rejection depends on the validity of the rejection of their respective base claim under 35 U.S.C. 102 given Jalali et al. However, since the rejection under 35 U.S.C. 102 has been traversed, and each of the independent claims is allowable, and none of the additional references are cited as supplying the

Serial No. 09/938,453

elements of the independent claims that are missing from Jalali et al., the rejection under  
35 U.S.C. 103 of the dependent claims cannot be maintained

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Serial No. 09/938,453

Conclusion

It is respectfully submitted that the Office Action's rejections have been overcome and that this application is now in condition for allowance. Reconsideration and allowance are, therefore, respectfully solicited.

If, however, the Examiner still believes that there are unresolved issues, he is invited to call applicant's attorney so that arrangements may be made to discuss and resolve any such issues.

In the event that an extension of time is required for this amendment to be considered timely, and a petition therefor does not otherwise accompany this amendment, any necessary extension of time is hereby petitioned for, and the Commissioner is authorized to charge the appropriate cost of such petition to the **Lucent Technologies Deposit Account No. 12-2325**.

Respectfully,

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Date: 5/11/07